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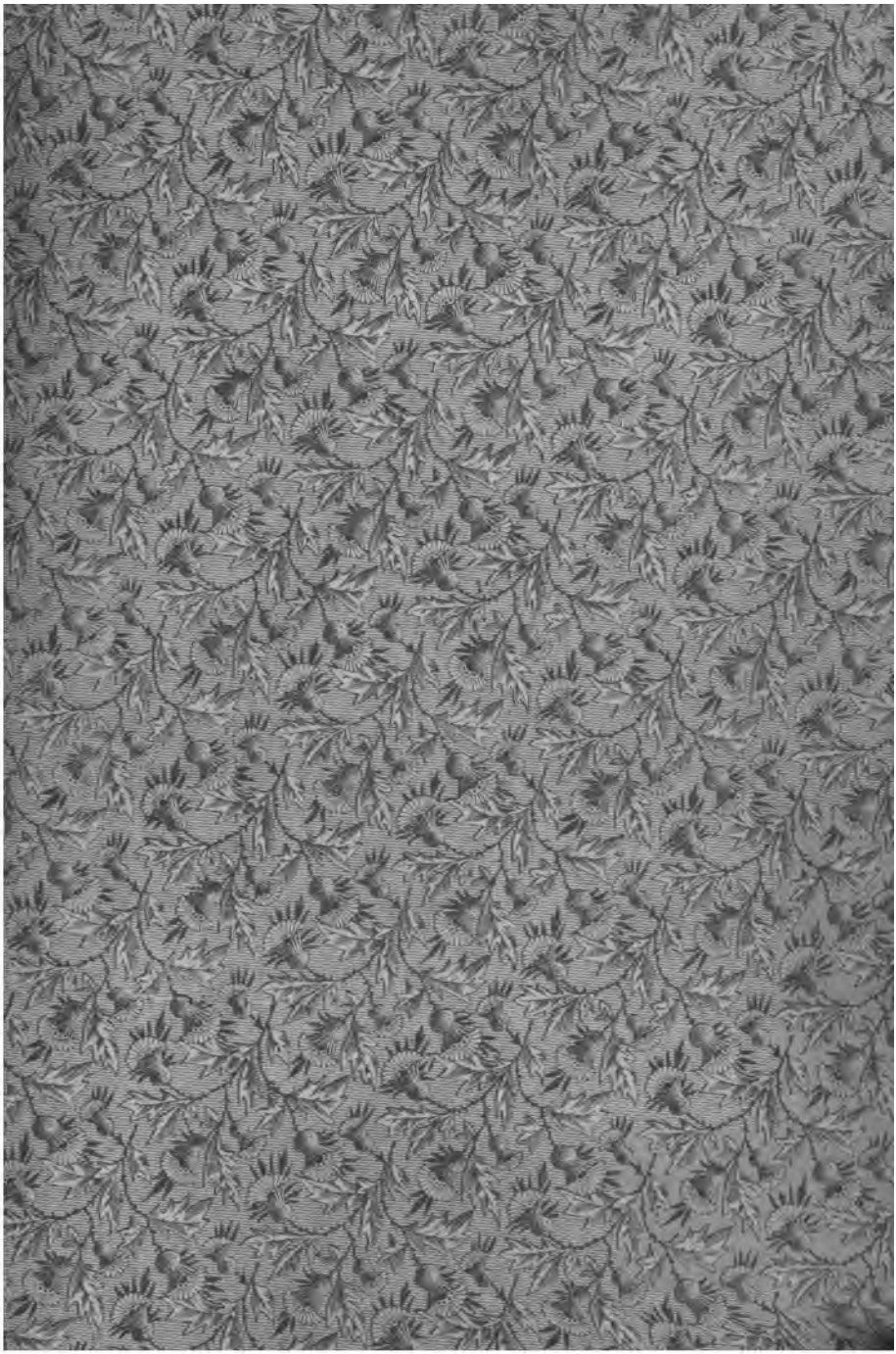
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HAY FEVER

And its Successful Treatment by Superficial Organic Alteration of the Nasal Mucous Membrane.

AN ESSAY READ BEFORE THE PHILADELPHIA LARYNGOLOGICAL SOCIETY, APRIL 24, 1885.

BY

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PREFACE.

THE comparatively large number of cases of so-called "hay fever" treated by the author within the last four years, having enabled him to note the value of certain practical points in connection with its successful treatment, he respectfully dedicates this little volume, in which they are collected, to his professional brethren, hoping that the suggestions which it contains will be of service to them.

PHILADELPHIA, May 1st, 1885.

HAY FEVER

AND ITS SUCCESSFUL TREATMENT BY SUPERFICIAL ORGANIC ALTERATION OF THE NASAL MUCOUS MEMBRANE.

HAY FEVER, also known under the names of hay asthma, rose cold, summer catarrh, autumnal catarrh, peach cold, rag-weed fever, idiosyncratic coryza, June cold, etc., etc., may be defined to be *an affection characterized by periodical attacks of acute rhinitis, complicated sometimes with asthma, occurring as a result of a special susceptibility on the part of certain individuals to become influenced by certain substances, owing to a deranged state of the nerve-centres. It manifests itself only provided the mucous membrane primarily affected in the course of an attack is in a state of hyperæsthesia, and when the irritating substances are present in the atmosphere.*

The symptoms of hay fever may be limited

to those of a mild coryza and last only a few days, or they may assume such violent form as to cause the patient great suffering. The attack usually begins with a sensation of itching in the nostrils, which soon becomes very intense, and causes violent and prolonged sneezing. A pricking, burning sensation in the inner canthi, followed by profuse lachrymation, may accompany this symptom, or constitute the first evidence of the access. Very soon the nose becomes occluded through turgescence of its lining membrane, and respiration through it is practically impossible. A watery discharge appears, which soon becomes very profuse, and its strongly alkaline character causes it to irritate the nostrils and the upper lip, sufficiently sometimes to give rise to painful excoriations. Violent sneezing may begin at once, or occur when the watery discharge begins to trickle down along the intranasal walls, and the patient makes futile efforts by immoderate use of the handkerchief, to clear the nose of the cause of irritation

and obstruction. Chilly sensations, frontal headache, tinnitus aurium, loss of smell and taste, violent itching at the roof of the mouth, pain over the bridge of the nose, facial pruritus, and general symptoms, such as slight pyrexia, urticaria, disordered stomach and flatulence, are among the possible accompaniments of this stage.

As the affection progresses, the nasal secretion assumes more of a mucoid character, becoming at times muco-purulent. The conjunctiva may become greatly inflamed, and photophobia and marked chemosis follow, rendering, in some cases, a prolonged stay in a dark room necessary.

Premonitory symptoms are present in a small proportion of the cases, especially in those of long standing. Frontal headache, general malaise, chilly sensations, and itching at the roof of the mouth and eyes, occurring from two days to two weeks before the attack, are among those most frequently complained of. Asthma may occur as a complication of

the affection, or as its only symptom. In the former case, it may present itself any time during the course of the disease; in the latter, it manifests itself suddenly as soon as the irritating agent is inhaled. In the majority of cases, however, it begins a few days after the primary nasal symptoms have shown themselves, and as soon as these become marked. A feeling of soreness in the region of the pharynx is experienced, followed shortly after by hoarseness, slight cough, scanty expectoration, and a feeling of constriction about the chest, and the asthma comes on insidiously, gradually increasing in intensity as the disease advances. It is generally much worse at night than in the day time, relief coming on with the dawn of day. In some cases it ceases with the nasal symptoms, or soon after; in others, and this forms the majority, it lasts much longer, prolonging the suffering of the patient over weeks and even months.

The affection presents itself twice in the year in some individuals, while in others it

either occurs in May or June, or during the last two weeks of August or early in September. The summer variety, generally called "rose cold," is not as a general thing as severe as the autumnal variety or "hay fever," and does not last as long. Subjects of the disease can in almost every instance predict the exact day, and sometimes the hour, of the onset of the expected attack.

Etiology.—Since 1819, when Bostock first described the affection, of which he was himself a sufferer, numerous theories have been advanced to explain the peculiar periodicity of the affection and its cause. As early as 1839, Elliotson pointed to pollen as the probable cause of the affection, while twenty years later, Abbott Smith, Pirrie, and Moore, ascribed its active cause to the emanations of plants. In 1869, Helmholtz suggested that the disease was due to the presence of vibrios in the nasal cavities, which remained dormant in the winter months, and became active through the effect of the summer heat. Twelve

years ago, Blackley, of Manchester, reiterated Elliotson's opinion, that the affection was caused by the pollen of flowers and grasses, and demonstrated by a series of experiments the power of these substances to bring on an attack. In 1876, Beard, of New York, published a monograph, in which he showed that a large number of the sufferers were of a nervous temperament, and that the exciting agents were very numerous, and not limited to the pollen of flowers and plants, as was formerly thought. In 1882, Daly,* of Pittsburgh, published a paper, in which he attributed the annually recurring attacks "to local chronic disease, upon which the exciting cause acts with effect," adding that "the parts should be put in order, and thereby enable them to withstand the exciting influence of the next recurring crop of bacteria." In 1883, Roe,† of Rochester, N. Y., advocated the same theory, and stated "that hyperæsthesia is associated

* Archives of Laryngology, Vol. II.

† N. Y. Med. Jour., May 12th and 19th, 1883.

with, or occasioned by, a diseased condition, either latent or active, of the naso-pharyngeal mucous membrane," and "that the removal of the diseased tissue in the nasal passages removes the susceptibility of the individual to future attacks of hay fever." Later in the same year, unacquainted with the papers of Daly and Roe, I published an essay,* in which I advanced "that hay fever was due to an idiosyncrasy on the part of certain individuals to become affected by certain emanations," that "organic alteration of the surface of the nasal mucous membrane altered its sensibility, and destroyed what morbid irritability might have attended the nervous filaments distributed over it," and, furthermore, "that hypertrophies of the nasal membrane increased its irritability, and the intensity of the symptoms." In January, 1884, Harrison Allen, of Philadelphia, in an article on the treatment of hay fever,† attributed the disease to permanent or

*Med. and Surg. Reporter, December 22, 1883.
†Am. Jour. of Med. Sciences, January, 1884.

temporary obstruction of one or both chambers, and advanced the opinion that by overcoming this obstruction by the usual methods, a cure could be effected. In June of the same year, J. N. Mackenzie,* of Baltimore, suggested the term "Coryza vaso-motoria periodica," on the ground that "the disease is essentially a coryza, showing in most cases a decided tendency to periodic recurrence, and dependent upon some functional derangement of the nerve-centres as its predisposing cause."

In summing up these various theories and judging of their value by the practical results attained, it becomes evident that an important step has been made in our knowledge of the affection, by the recognition of the important part played by the nasal mucous membrane in the history of the affection.

As advocated by myself in my first paper,† three conditions are essential factors in the production of an access of hay fever: Firstly,

*N. Y. Med. Record, July 19, 1884.

† *Op. cit.*

an external irritant; secondly, *a predisposition on the part of the system to become influenced by this irritant;* and, thirdly, *a vulnerable or sensitive area through which the system becomes influenced by the irritant.* This theory, it seems to me, not only conciliates the demonstrated and irrefutable portions of the three principal views advanced as to the etiology of the affection: irritation by pollen and the emanations of plants, etc. (Elliotson, Smith, Moore, Blackley, Morrell Mackenzie); the neurotic element in the production of the affection (Beard, J. N. Mackenzie); and local disease of the naso-pharynx (Daly, Roe, Hack,* and Allen); but it is exempt from the fallacies presented by each of these views taken separately.

As to the first condition, the elaborate and persevering researches of Blackley and the observations of Beard on the subject, demonstrate conclusively to my mind the power of certain substances to produce an access in individuals susceptible to their influence.

* Wien. Med. Wochen., August, 1883.

Blackley caused, by applying to the mucous membrane of certain individuals, less than $\frac{1}{200}$th of a grain of the substance to which they were sensitive, all the symptoms which presented themselves during the course of an ordinary attack, while in his own person the simple inhalation of pollen produced all the characteristic symptoms. Cases are frequently met with, in which the mere approach of certain substances is sufficient to bring on a paroxysm even out of the usual time, while the removal of the subject from the irritating agent in the midst of the yearly period, and while an access is present, will cause the latter to cease. Again, as demonstrated by Dr. Blackley,* the attacks can be greatly modified, if not prevented, by placing in the nostrils some contrivance which will purify the inhaled air of its irritating substances, showing plainly the power of the latter to induce a paroxysm.

Another evidence that pollen is a factor in the etiology of the affection, is the regularity

* London Lancet, August 27, 1881.

with which the majority of plants undergo the different phases of their growth, each recurring the same day every year, and in some the same hour. This not only explains the periodicity of the accesses, but the precision with which most sufferers can prophesy the onset of their attacks.

The mere irritating property of a substance is evidently not the only factor in the production of the attack. This is exemplified by the fact that one subject may be affected by a certain substance which will in another be absolutely harmless. A gentleman under my care, for instance, although a great sufferer yearly almost since birth, can take rag-weed between his hands, crush it and inhale its emanations without experiencing the least ill-effect; and yet this plant is recognized as one of the greatest enemies of hay fever sufferers. In another case, the pollen of roses alone produces the manifestations and all others are absolutely ineffective. Subjects are seldom found, however, in whom a single agent will give rise to

an access, the majority being influenced by several substances, with one in particular as the most active. Among the substances which are considered as causes of the affection, are dust, the pollen of plants in general, grasses and cereals, the emanations of certain flowers and perfumes, fruit, animals, sulphur, smoke, cinders, etc., while a small proportion of the sufferers ascribe the origin of their paroxysms to summer heat, sunlight, exposure to draughts of air, etc.

Dust, as observed by Beard, is the most common irritant, a fact which apparently weakens the pollen theory, but which in reality strengthens it. If we consider that pollen, like any other substance, is subject to the laws of gravitation, and that its very light weight is a provision of nature to insure its far as well as near dissemination, and its final fall to the ground; and that immense quantities of it are wafted through the atmosphere, subject to the mechanical displacement of its currents,—we can understand that the dust of the earth is

but a part of what is generally considered as dust, the principal of its other constituents being an agglomeration of the pollen of all the plants in the surrounding country, and sometimes of those of distant districts, as well as all ponderable agents capable of acting as irritants. It can thus be seen that dust is the most frequent cause of hay fever, because it is the common carrier of all the obnoxious agents. The universal distribution of dust in cities as well as in the country, furnishes a ready explanation for the prevalence of the disease in all regions excepting in those which contaminated dust, on account of its weight, can only reach in very small quantities or not at all, such as high altitudes, the open sea, etc.

The entire or partial freedom which the so-called "hay fever resorts" enjoy is due to this fact. Very few, if any, of these places, however, enjoy absolute immunity. A strong wind, which, having passed over fields and become impregnated with their pollen or with the dust of a country road, is liable to bring

one, a few, or many of the noxious agents within reach of the susceptible individual and cause in him the manifestations of the disease, if one or any of the substances to which he is sensitive are present. It thus frequently happens that only one or two persons among many are influenced. That some resorts insure immunity to some people and not to others, is explained by the fact that this immunity depends upon the presence within a certain radius, of the irritating substance. If a plant to which a subject is sensitive happens to grow within that certain radius, the location will naturally be unfavorable to him.

It has been frequently demonstrated that hay fever can be induced at any time of the year, and in regions where the disease never presents itself primarily, as in high altitudes or on the high seas, by the accidental presence of an irritant, brought there as a part of the dust covering clothes, parcels, etc. Wyman* and his son were thus attacked, while spending

* Morrell Mackenzie, Hay Fever, etc., London, 1884.

the hay fever period at a resort where they enjoyed absolute immunity, when a package of rag-weed plant was opened there. The paroxysms brought on by handling dusty objects which have been so for some time, or those occurring at sea several days after leaving port, are thus accounted for.

The extreme degree of irritation occasioned in most sufferers by riding in steam-cars or in a carriage *only* during the hay fever period, and due to the quantity of dust shaken up by the vehicle, adds further evidence in favor of the fact that uncontaminated dust is not a factor in the production of an access, since dust is present the year round and the membrane is not irritated at all times of the year; but that that dust becomes an active irritant in this affection only when contaminated with the substances to which the subject is susceptible. This contamination only taking place at a certain period each year, dust is only an irritant during this period; in other words, it only acts as a cause of the affection at cer-

tain seasons, because it is only during those seasons that the pollen in its active state is present in it.

As to the second condition essential to the production of an access, a predisposition on the part of the system to become inordinately influenced by certain substances, a close examination into the family history of the patient, and into his own since birth, will elicit much evidence towards proving that there is a systemic dyscrasia, through which the resisting power to certain diseases is diminished. In a list of forty cases now before me, I find that thirty-five per cent. have near relatives who present a clear history of hay fever or rose cold, and that forty-two per cent. have asthmatic relatives. It is thus shown that in a majority of cases (the percentage of family histories presenting either asthma or hay fever being fifty-five per cent.), there is an inherited predisposition to the affection.

Going further and taking a glimpse into the early life of these cases, I find that forty

per cent. have had *six* of the diseases incident to childhood, that sixty per cent. have had at least *five*, eighty-two per cent. at least *four*, ninety per cent. at least *three*, and that none were exempt, while one only had but one of them. These diseases were whooping-cough, measles, mumps, chicken-pox, scarlet fever, and croup. This singular proclivity to so many of these affections is certainly not a mere coincidence, the number of cases being too large to render such a proposition tenable. It seems to indicate a predisposing state of the system to all affections in which a neurotic element plays an important part, evidenced in the exanthemata by the eruption, in whooping-cough by the abnormal irritability of the pharynx, larynx and trachea, in the mumps by the marked tendency to reflex metastasis, and in croup by the spasmodic element inducing the dyspnœal paroxysms. That an inherent liability to these diseases must be present is further demonstrated by a comparison with the histories of forty persons not subject to hay

fever, in whom *ninety-two* of the so-called diseases of childhood had occurred, representing an average of *two and two-tenths* per cent., while in hay fever sufferers, *one hundred and eighty-nine* children's diseases had presented themselves, an average of *four and seven-tenths* per cent.

Still more curious in this connection, is the fact that of the forty cases upon which these remarks are based, *all have had whooping-cough.* Of all the affections cited, this is without doubt that in which the neurotic element is most marked. Both the respiratory and sympathetic nerve-centres are disturbed in its early stages, while the pneumogastric becomes implicated before the local causes of excitation are established, doubtless indicating a primary nervous element as a predisposing cause, while the universal presence of the affection in forty cases of hay fever, certainly suggests a common systemic cause for both diseases—*an abnormally sensitive nerve-centre upon which the element of contagion or the irritant acts with effect.*

In further support of the theory of systemic predisposition, I will enumerate a few of the cases presenting the greatest evidences of heredity, in which this heredity seems to exert some influence in the production of the so-called children's diseases:

Case No. 14, whose mother, uncle, and brother have hay fever, while his grandfather and first cousin have spasmodic asthma, has had the six diseases of childhood. No. 13's two brothers have hay fever; his mother and sister asthma; has had five (croup omitted). No. 15, great grandfather and first cousin, hay fever; grandaunt asthma; has had five (scarlatina omitted). No. 31, father, hay fever; great grandfather, two great uncles, asthma; six diseases, while all those presenting a direct maternal or paternal heredity of hay fever and rose cold, with one exception, have had the six diseases.

Accepting the theory as conclusive, as far as the question of heredity as a factor in the causation is concerned, a new problem sug-

gests itself: In those cases in which no evidence of heredity appears, what is the origin of the inordinate irritability? In other words, the possibility of an inherited liability being demonstrated, can it be acquired independently of heredity?

Of the nineteen cases in which no hereditary history could be traced, *fifty-five per cent.* have had *six* of the children's diseases enumerated, while *eighty-two per cent.* have had at least *four*, one case only having had but two. In the three cases which presented two or three diseases, I find that in one case, there is a subsequent history of typhoid fever, malarial fever, and bronchitis, all occurring before the first access of hay fever; in a second, migraine was a frequent visitor before the hay fever presented itself; while in the third, a child, the whooping-cough and chicken-pox had been very severe.

Taking the rationale of these sixteen cases, with a history of at least four diseases, all of them presenting marked neurotic element, is it

not probable that a functional derangement of the nerve-centres resulted, and that they were thus rendered more sensitive to influences which, had they been in their normal state, would not have affected them? Again, is it not reasonable to suppose that in the first exception, the subsequent diseases accomplished what the others had begun, debilitating still more the nerve-centres, which had already been weakened to a certain degree by the early diseases? In the second exception, a neurotic element is apparent in the character of the primary disease, while in the third the virulence of the diseases must certainly have borne its influence on the secondary results.

Evidence to show that a neurotic element is an essential part of the affection, can easily be adduced by merely investigating the origin of the premonitory symptoms which are present in a number of cases. It would certainly be very difficult to explain their presence, were we to overlook the implication of the nervous system. Among the forty cases described, may

be found one young man who complains of "a tickling in the roof of the mouth" one week before the onset; another patient speaks of dull pains in the head and back two weeks before; still another experiences chills and shuddering ten days before the attack, etc., while a large proportion complain of palpebral pruritus from two to ten days before the nasal symptoms begin. If the local irritant is the only cause, why does the respiratory tract, the portion of the body first and most exposed to its effects, not become immediately influenced? At this juncture a question naturally suggests itself: What then induces these premonitory symptoms? Again referring to the cases, we will find that premonitory symptoms only present themselves in cases in which hay fever is of some years' standing. As the accesses become more frequent, the system habituates itself to these annual or bi-annual attacks, and periodicity becomes an element of the case, marked in proportion with the degree of impairment of the nerve-centres. As an

illustrative case, I will cite that of a medical friend, who, in a letter to me, spoke as follows: "My attacks for some years past came with much regularity, about August 12th to 14th. On these dates this year, I arranged to be on the water, on Lake Ontario and the St. Lawrence River, and entirely escaped everything like sneezing and irritation of the nose and eyes. Still, I had the usual slightly hot and irritable skin, then an eruption of urticaria, accompanied by disordered stomach. This experience is precisely the same as in 1880, except that then I was on the Atlantic, on shipboard." In this case, the neurotic element is distinctly shown by the eruption and the gastric disturbance, while periodicity alone can explain the presence of the symptoms at the precise time and the favorable localities in which they manifested themselves.

As to the nervous symptoms occurring during the course of an attack, I am more disposed to consider them as due to reflex irritation from the local trouble than as originating

primarily in the nerve-centres. During the access, the susceptibility of the reflex centres is developed to its utmost extent, and sunlight, a draught of air, etc., will give rise to most violent symptoms, which would not be the case at other times.

Accepting the above as conclusive in demonstrating the presence of a neurotic element, another question presents itself, which, left unanswered, would expose the theory to potent criticism: It being a recognized fact that in many individuals, there is impairment of the nerve-centres, either due to heredity or to disease, fully as extensive as in the worst hay fever subject, how is it that hay fever does not manifest itself in all these individuals? To answer this, the third condition comes to our rescue: In persons who are not subject to hay fever, the nasal mucous membrane is either in its normal state, or, if diseased, the local trouble is not of a nature to induce an abnormal susceptibility to irritation, and the systemic dyscrasia is not awak-

ened to action, while in the hay fever patient, an hyperæsthetic state of the mucous membrane, either latent or due to local disease, is always present, furnishing a vulnerable or sensitive area through which the impaired nervous system can become influenced by the external irritant. *Both systemic and local elements must exist simultaneously to render a paroxysm possible.*

That the local condition of the nasal mucous membrane is an essential factor in the production of an attack, was demonstrated by the results attained with a treatment in which this point was kept in view. As long as it was overlooked, all efforts to conquer the disease were fruitless. As soon, on the contrary, as its true importance was duly appreciated, the chances of cure became greater than in any chronic affection of the nose.

What evidence have we to indicate the presence of sensitive spots in the nasal cavities?

Some time ago, Dr. J. N. Mackenzie,* of

*Am. Jour. Med. Sciences, July, 1883.

Baltimore, published an interesting article on "Nasal Cough," in which he demonstrated that "there exists in the nose a well-defined sensitive area whose stimulation through a local pathological process, or through *ab extra* irritation, is capable of producing an excitation which finds its expression in a reflex act, or in a series of reflected phenomena." It is located at the posterior end of the inferior turbinated bones and the corresponding portion of the septum (*b* Fig. 1). I have frequently been able to verify this assertion, not only in the production of cough, but also in the production of reflex asthma, in cases in which a predisposition to this affection existed. Professor Hack,* of Freiburg, Germany, has also demonstrated that various reflex neuroses originate in a diseased condition of the nasal mucous membrane. Unlike Dr. John Mackenzie, however, he locates the area from which the reflex symptoms take their origin at the anterior

*Ueber eine Operative Radical-Behandlung bestimmter Formen von Migräne, Asthma, Heufieber, etc., August, 1883.

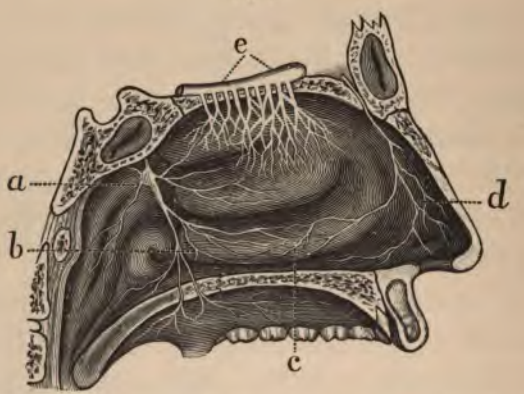
extremity of the inferior turbinated bone (*c* Fig. 1), and advises the removal of the latter for the cure of hay fever. In cases in which there was anterior hypertrophy, without a history of hay fever, I have not succeeded as yet in producing by local pressure, any evidence of reflex action, while in some of the cases, the same procedure in the posterior portion of the nasal cavity (Mackenzie's area) would elicit marked reflex symptoms.* In cases of hay fever, however, I have almost invariably found marked hyperæsthesia in this portion of the nasal cavity, with reflex symptoms in the superior maxillary region.

In addition to these two sensitive areas, practical experience in a large number of cases has demonstrated to me that a third area, of no less importance than that of Dr. J. N. Mackenzie, exists in the anterior portion of the

*The fact, however, that the terminal fibres of the nasal branches of the spheno-palatine ganglion and of the nasal branch of the ophthalmic meet there and form quite a network, certainly verifies the view held by Hack, as to its being a reflex area of importance.

nasal cavity, near the angle forming the anterior boundary of the vestibule, and located upon the nasal wall, as well as on the septum. This area is indicated in Fig. 1 by the letter *d*. In the great majority of persons subject to hay fever, if not in all, the surface of the mem-

Fig. 1.



a, Spheno-palatine ganglion; *b*, posterior area; *c*, middle area; *d*, anterior area; *e*, olfactory bulb.

brane in this locality is exquisitely sensitive, and the contact of a probe provokes intense itching and lachrymation.

It thus becomes evident that there are in

the nose three areas capable of producing reflex symptoms in the course of a paroxysm of hay fever, and that the three combined form the key of the local nervous element. I do not wish to imply, however, that the three areas must necessarily take part in the production of an access; in some, only one of the three will be the "sensitive spot;" in another, the posterior and middle areas will be involved, etc., etc. Again, a difference of intensity may exist in the degree of hyperæsthesia; while one area may be but slightly sensitive, the next may be extremely so. In cases complicated with asthma, for instance, I have noticed that both anterior and posterior areas are sensitive, the latter being principally so, both giving rise to more or less reflex manifestations, but that when the paroxysms are uncomplicated, the anterior area is much more sensitive than the posterior.

An explanation of the origin of this local hyperæsthesia would not be difficult did it involve the middle and posterior areas of the

nasal cavity only. Here it may be caused by most of the affections of the anterior nasal cavity, from simple chronic rhinitis down to nasal polypi. But how can we explain its origin in the anterior portion of the cavity, which seldom takes part in the diseases to which the other portions are liable? This leads us to the discussion of another question: Can hyperæsthesia of the nasal mucous membrane occur idiopathically or is a pathological process necessary as a primary cause?

In three of the cases which have so far come under my care, examination some weeks before the access appeared, not only presented the cavities in their normal state, but I could not obtain from the patient any indication of the presence during the period intervening between the accesses of any, even temporary, local trouble. Artificial stimulation with the probe to ascertain the location of the hyperæsthetic spots, as first suggested by Roe,* however, demonstrated clearly the presence

* Vide New York Medical Journal, May 3d and 10th, 1884.

of several of them, and in one case gave rise to a number of reflex symptons. It thus appears evident that a healthy membrane, in the ordinary sense of the word, can become hyperæsthetic without having undergone a local pathological process, and this be due to implication of the nasal nerve-supply in the general neuræsthenia. But the small number of hay fever sufferers among the large number of neuræsthenic people, makes this theory hypothetical, and the more plausible and less criticisable one of local chronic disease as a cause of the hyperæsthesia must be accepted. In the three cases in which no disease could be discovered, then, a pathological process, not sufficiently marked to be appreciated by ocular inspection, must have been present. As far as the anterior sensitive area is concerned, it is not unlikely that the proximity of an active pathological process maintained, by continuity of tissue, a latent inflammatory state which caused the hyperæsthesia.

As to the differentiation of one irritant

from another, I believe, with Dr. J. N. Mackenzie,* that it resides in the nerve-centres themselves. Their abnormal state renders them much more susceptible to the effects of external influences, and their discriminating power is increased in proportion. Let there be in a certain subject any unusual susceptibility to any particular substance or substances, this will be increased in proportion to the degree of disturbance in the nerve-centres, the result being an exalted reflex manifestation. This peculiar susceptibility to certain substances is well exemplified by the violent coryza brought on in some persons by ipecacuanha. So sensitive are some to its effects, that a few moments spent in a drug store are sufficient to cause an attack.

A number of secondary circumstances seem to exert some influence in the production of the affection, the principal of which is nationality. It is a strange fact that the Americans and the English are the principal sufferers.

* *Op. cit.* Page 8.

It might not be amiss to suggest that these are the only two great tea-drinking nations, and that this beverage may exert a depressing influence on the nerve-centres, and aggravate an inherited or acquired neuræsthenia.

The affection seems to be most frequent among people of education and those in comfortable circumstances, or whose occupation is sedentary. This may be due to a lack of wholesome exercise in the open air, a fact which I have been able to appreciate in the great majority of cases.

Heredity has been shown to exert great influence in the etiology of the affection, thirty-seven per cent. of the forty cases alluded to in the first part of this essay, having relatives who are sufferers of either rose cold or hay fever, while asthma, which is, as shown, a predisposing cause, is present in eighteen per cent. more.

The affection seems to be somewhat more frequent in men than women, the use of tobacco and other pernicious habits in the

former being possibly accountable for the difference.

Pathology.—Having considered the essential etiological factors of the affection, we will now enter into the pathological considerations bearing directly upon the production of a paroxysm. Before doing so, however, it might be advisable to review briefly the anatomy of the Schneiderian membrane, the turgescence of which constitutes the main feature of the affection.

An important point in connection with the curative measures to be adopted, is a proper recognition of the fact that each nasal cavity is divided into two regions which have distinct physiological functions,—the olfactory region, in which the sense of smell is located, and the respiratory region, the function of which is to purify the air of foreign substances, besides furnishing it with the necessary moisture and warmth before it reaches the lungs. As can be seen in Fig. 1, the filaments of the olfactory nerve cover the superior turbinated and the upper third of the middle

turbinated bone. They also cover the corresponding portion of the septum. The upper part of the nasal cavity is thus devoted entirely to the sense of smell and not involved in the pathological etiology of hay fever.

The respiratory region, which includes all the surfaces below the olfactory, is covered by a highly vascular membrane, especially thick over the inferior and middle turbinated bones, which possesses to a marked degree, the power of becoming turgid or erect, sufficiently so, sometimes, to completely occlude the nasal cavity. This membrane, termed by Bigelow, of Boston, the turbinated *corpora cavernosa*, on account of the large venous sinuses or caverns which it contains, and which, by becoming suddenly filled with blood, cause its turgescence, is under the control of vaso-motor nerves of the sympathetic system, and is exceedingly sensitive to local or peripheral irritating causes. This sensitiveness, however, does not reside in the vaso-motor supply, which is only a secondary factor in the production of the tur-

gescence, but in the terminal filaments of the sensory nerves distributed over the surface of the membrane. A brief allusion has already been made to these, when speaking of the different hyperæsthetic areas, but they were not sufficiently described to render a clear outline of the pathological process possible. Commencing with the posterior area, we find that the membrane of that location is supplied by several branches of the spheno-palatine ganglion, which enter the back part of the nasal fossa by the spheno-palatine foramen. Besides its motor and sensory roots, the spheno-palatine ganglion possesses a sympathetic root, which is derived from the carotid plexus through the vidian, thus forming a well-defined connecting link between the nasal membrane and the sympathetic system.

In the production of the reflex symptoms peculiar to the posterior area, cough and asthma, the impression is consequently transmitted from the posterior end of the inferior turbinated bone or the corresponding portion

of the septum, to the spheno-palatine ganglion; from that to the carotid plexus, which is closely connected with the posterior pulmonary plexus, formed not only by the branches of the sympathetic but also by some from the pneumogastric, and finally to the ramifications of the air-tubes through the ultimate filaments of the former, which are lost in the bronchial mucous lining. In many cases, however, the asthma is not due to reflex action, but to the gradual extension of the catarrhal inflammation from the nasal membrane, down along the pharynx, trachea and bronchi. In these cases, the asthmatic symptoms only manifest themselves some time after the onset of the paroxysm. In both varieties the exciting cause and the ultimate results are the same, but in the one the link between them is the nervous system, while in the other it is the mere continuity of tissue. The frequently complained of symptom, itching at the roof of the mouth, is readily explained by the presence of a large number of branches

which emanate directly from the spheno-palatine ganglion and are distributed throughout the membrane covering the inferior surface of the hard and soft palate.

The middle area being formed by the terminal fibres of the branches constituting the posterior and anterior areas, irritation over it may give rise to any of the reflex symptoms which the two former occasion.

The anterior area includes the nasal nerve, one of the principal branches of the first division of the fifth pair, the ophthalmic, which supplies the eyeball, the lachrymal gland, the mucous lining of the eye and nose, and the integument and muscles of the eyebrow and forehead. This distribution, and the fact that the ophthalmic is a sensory nerve, explains readily how a pathological condition involving the nasal nerve may produce so many varied symptoms. In the production of lachrymation and palpebral pruritus, we have the lachrymal branch, which supplies not only the lachrymal sac, but also

the conjunctiva. In addition to this cause, however, closure of the tear duct certainly contributes greatly to the profuse lachrymation. The photophobia also finds an easy explanation, if we consider the communication existing between the first division of the fifth pair and the ophthalmic or ciliary ganglion, the filaments of which are distributed to the ciliary muscle and the iris. If we couple this with the fact that the pupil is dilated when the eyes are implicated in the paroxysm, we can understand how exposure to sunlight can aggravate the symptoms of the affection, and appreciate the pathological verification which it furnishes.

In accordance with these views, the production of a paroxysm may be briefly described as follows: A given irritant coming in contact with the hyperæsthetic nasal membrane in a neuræsthenic subject, the impression made on the former is transmitted through the afferent fibrillæ of the nearest set of sympathetic ganglia to those ganglia, and returned by them to the

vaso-motor nerves of the membrane. The result is the same as in acute rhinitis—a primary contraction of the vessels followed by dilatation, the venous sinuses or corpora cavernosa becoming filled with venous blood and remaining distended. Violent sneezing occurs as soon as the membrane of the septum and that over the turbinated bones touch, and reflex asthma presents itself if the distention is sufficiently great in the posterior area to cause pressure against the septum. In the anterior area, the manifestations are not local, but occur in the parts which are in direct nervous communication with it. We thus have lachrymation, photophobia, headache, facial and palpebral pruritus, and so forth. If the distention is great in the middle area and nowhere else, we may have the whole train of symptoms, both anterior and posterior areas being involved, while implication of the posterior area will give rise to asthma if there is sufficient turgescence to cause pressure against the septum, and if the asthmatic tendency exists in

the patient. As to the general systemic disturbances present in connection with the head symptoms, they are easily accounted for by the momentary increase of the abnormal excitability of the nerve-centres.

In my opinion, a paroxysm brought on by peripheral irritation, exposure to draughts, wind, dampness, etc., or occurring as a reflex manifestation from other parts of the body in an abnormal state at other times than in the hay fever season, cannot be considered as hay fever. It is an attack of acute coryza, due to the fact that the nasal mucous membrane receives its vaso-motor innervation from a ganglion which is the part of least resistance in the patient's economy,* and which does not require a *special* agent to become influenced.

Treatment.—The first indication in the treatment of hay fever is to ascertain by careful examination of the nasal chambers, whether the condition which gave rise to the hyperæsthesia is sufficiently marked to receive

* Woakes' "Post-Nasal Catarrh," p. 43, 1884.

special attention. In the great majority of cases, a simple chronic rhinitis exists with a tendency to frequent or permanent turgescence of the mucous membrane. In others we have true hypertrophy, involving either the anterior or posterior portions of the nasal cavities, or both. Occasionally we find polypi, which occlude more or less one or both cavities, while a deviated or thickened septum may keep up a marked irritation and constitute a serious obstacle to a subsequent thorough treatment. When these, or any other abnormal condition compromising mechanically the lumen of the cavities, are present, they should first receive attention, and the nasal cavities returned as nearly as possible to their normal state. If the treatment employed be one of a destructive nature, the organic changes induced by it in the mucous membrane proper, will often be sufficient to annul its hyperæsthesia. This was exemplified by the cases reported by Daly,* Roe,†

* *Op. cit.* p. 6. † *Op. cit.* p. 6.

(first paper), in two of the first reported by me, and in several reported by Dr. Harrison Allen.* In a large proportion of patients, however, it does not suffice, and immunity from the disease can only be expected after each sensitive spot has been thoroughly cauterized.

The condition most frequently met with, a simple chronic rhinitis with tendency to frequent or permanent turgescence of the membrane, often mistaken for hypertrophic rhinitis and treated as such, can be differentiated from the latter by noting the sluggish recoil of the turgescent membrane when pressure upon it with a probe is suddenly discontinued, and the completeness of its collapse under the influence of a four per cent. solution of hydrochlorate of cocaine. Such a condition having been recognized, the application of an escharotic over a limited area is indicated. One application of nitric acid generally suffices for each nostril. The small

* *Op. cit.* p. 7.

cotton-carrier shown in Fig. 2 is the most desirable instrument for the purpose, the diminutive thickness of the blade enabling the operator to wrap a thin film of cotton-wool around its tip, and still form a very small volume. The nostril being well dilated and illuminated, the end of the cotton-carrier is dipped into the acid and pressed against a piece of blotting-paper, so as to part with any excess of acid and prevent dripping. It is then introduced into the nose and applied to the most prominent portion of the inferior or middle turbinated bone, or both, as the case may be, taking care not to touch the septum. A sharp pain follows if the acid is applied pure, which will be avoided if hydrochlorate of cocaine has previously been dissolved in it to saturation.* An eschar is the result, which upon healing forms a cicatrix which prevents future distention, this being

* The experiments with such a mixture for cutaneous applications by Dr. N. A. Randolph and Mr. S. G. Dixon, reported in their "Notes from the Physiological Laboratory, etc.," Philadelphia, 1885, suggested its use in the nose to me.

assisted by the consolidation induced in the deeper layers of the membrane by the acute inflammatory process following the cauterization. Galvano-cautery can be used with advantage in the manner described below instead of the acid, the edge of the knife, at cherry heat, being introduced into the most prominent portions of the membrane.

Fig. 2.



Harrison Allen's cotton-carrier.

In all applications of this character, there is danger of inflammatory adhesion with the septum, when the parts are in close apposition. To guard against this, the patient should be seen in a couple of days, and if any tendency to adhesion should show itself, *i.e.*, bands of soft tissue connecting the burnt area with the opposite surface, they should be torn by passing a probe through them, and a cotton wad anointed with cosmoline interposed.

Hypertrophies of the membrane can be recognized by the resistance which they offer to the pressure of the probe, and the suddenness with which they reassume their conformation under the application of the cocaine. The membrane, completely emptied of its fluids, cannot contract more than the organized elements in its layers will allow, and its actual thickness can then easily be determined. In uncomplicated chronic rhinitis the contraction is almost complete, the thickening in the sub-epithelial layer not being sufficient to cause any appreciable difference in its appearance. Its surface is smooth and uniform, the conformation of the bone beneath being often descernible. As soon as sufficient hypertrophic tissue has formed to become noticeable, however, the smoothness and uniformity are lost, and irregular prominences appear, indicating the localities in which the hypertrophic process is most advanced, and where surgical measures will be most effective.

The presence of hypertrophic rhinitis having been recognized, a successful result can only be obtained by resorting to a treatment calculated to destroy a sufficient quantity of the redundant tissue to insure, with the assistance of the resulting inflammation and the subsequent cicatricial contraction, its complete reduction.

The means at our disposal for the reduction of hypertrophied mucous membrane differ according to the degree of hypertrophy, and consist in the use of caustic acids, galvano-cautery, the galvano-caustic snare, and the cold wire snare.

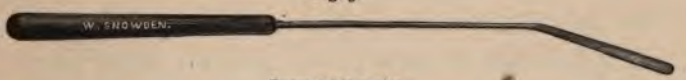
The three acids usually employed are the nitric, chromic, and glacial acetic. The first is by far the most powerful, and its action can only be limited by using it in very small quantities at a time. If too much is applied to the membrane, deep-seated ulceration may ensue, and give rise to much annoyance.

As already explained, a very thin probe should be used, with a film of cotton wrapped

around the tip. Being dipped in the acid, and applied against a blotter to prevent dripping, the cotton pledget is applied to the most prominent portion of the membrane, limiting the application to an area about the size of a small pea. A sharp pain is felt, unless the membrane be previously anæsthetized with cocaine, or the acid contain a sufficient quantity of the latter in solution. When the cocaine is not used, however, the pain can be quickly arrested by applying with the atomizer, a saturated solution of bicarbonate of sodium, which will also limit the penetration of the acid. During the day, the patient experiences a sensation of fullness in the nostril cauterized. This, however, only lasts a few hours, and in some cases does not occur at all. The next day, shreds of the destroyed mucous membrane are discharged, and a feeling of relief is at once experienced. This continues until all the cauterized tissue has been thrown off, leaving a groove to mark the seat of the exfoliation. This groove gradually fills up, not

by reproduction of tissue, but by a displacement, as it were, of the surrounding superficial stratum, which contracts, thereby constricting the parts beneath. This process requires for its completion about a week. A great advantage possessed by nitric acid is that it requires but one or two applications to contract markedly the hypertrophied membrane. At least two weeks should elapse between each appli-

Fig. 3.



Bosworth's probe.

cation. An earlier renewal of the cauterization on the same spot might give rise to serious inflammation, and perhaps erysipelas.

In inexperienced hands, glacial acetic acid is a much safer agent, but requires a greater number of applications to produce the same effect. The instrument shown above, devised by Dr. Bosworth, of New York, is very convenient for its application. Its end is flattened, and when wrapped with cotton, presents a

comparatively wide surface, while at the same time it can be introduced into the narrowest cavity. It is dipped into the acid if both sides of the cavity are to be treated, that is, if there is septal hypertrophy besides the turbinate, or dropped on one side if the hypertrophy be limited to the latter. The vestibule being dilated and illuminated, the charged end is passed into the nasal cavity along the free edge of the hypertrophied turbinated body or applied to the septal growth, as the case may be. The pain induced is much less severe than when nitric acid is used, but again the amount of tissue destroyed is much more limited. Seven or eight applications at a week's interval are necessary to produce the effect of one application of nitric acid, but the improvement is gradual and steady, and if care be taken to touch the same spot each time, in order to as much as possible avoid the destruction of the ciliated epithelium, not only will the stenosis be remedied, but the physiological functions of the membrane proper will be preserved.

Chromic acid is highly recommended by several eminent specialists. The most convenient method for its employment is to heat the tip of an ordinary probe and to apply it against one of the acicular crystals of the acid. Care should be taken not to overheat the instrument, lest decomposition of the acid occur. Enough adheres for two applications. Chromic acid gives rise to little or no pain, and is very effective, but systemic intoxication is liable to occur if too great a quantity is used at one sitting. Its application should consequently be limited to a small area, and renewed from two to five times as the case may be. As with nitric and glacial acetic acid, any excess can be neutralized by applying over the cauterized surface, a saturated solution of bicarbonate of sodium.

Galvano-cautery possesses many advantages over any method employed for the reduction of hypertrophies. Its application gives rise to but little pain, and the local inflammation following its use is so limited, that it is hardly

perceived by the patient in the great majority of cases. A number of excellent batteries are at our disposal, among which may be mentioned Seiler's, of Philadelphia, and Piffard's, of New York. The former is the more convenient of the two instruments, and was used by me until lately, when, having replaced cold wire snaring by galvano-caustic snaring in my practice, I found it necessary to devise an apparatus capable of furnishing a greater quantity of electricity when this was required, without increasing the bulk of the instrument.

When the hypertrophy is situated anteriorly and is not very large, a linear incision, made with the edge-knife, is sometimes sufficient to reduce it completely. In order to obtain the best effect from the cauterization, the platinum loop must be introduced glowing, and the margin of the nostril must therefore be protected. Dr. Harrison Allen's nasal speculum is very efficient for the purpose, and several sizes being procurable, a suitable instrument can be employed in each case. It

should be inserted and held with the left hand in such a manner that the prominence to be treated will appear opposite the small opening. The knife is then entered into the speculum, and the circuit closed just as the platinum loop has reached beyond its external or wide opening. Holding it there an instant, until the proper heat is attained, the instru-

Fig. 4.



Allen's nasal speculum.

ment is pushed forward so as to cause its sharp edge to penetrate the centre of the prominence, and advanced until an incision of the desired length has been made. The circuit is then broken, and the instrument withdrawn cold. As a result, the different layers of the membrane are severed, including the dilated blood-vessels and sinuses, and

cicatrical bands are formed which cause the contraction to involve its entire thickness.

An important matter in connection with this operation, is the proper regulation of the heat. When the platinum point is not sufficiently hot—*black heat*—it causes great pain. When it is too hot—*white heat*—it causes profuse hemorrhage. Cherry heat is hardly felt by the patient, causes no bleeding, and is more effective than either of the two others.

Some specialists employ a shield to protect the membrane of the septum; I have never found such an instrument necessary, and merely apply a little vaseline over its surface, to avoid the sensation of heat which the radiation from the hot metal might occasion. Should the septal membrane be accidentally touched, the burn heals without trouble. Such is not the case, however, if the skin around the margin of the nostril is singed; the pain is not only very severe, but lasting.

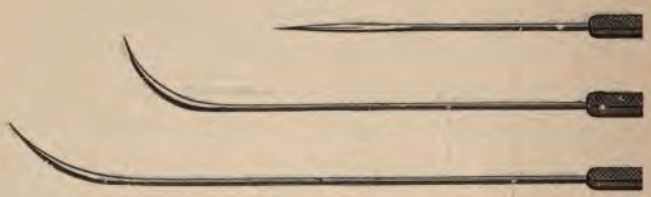
The after-effects of an application of gal-

vano-cautery, performed in this manner, are almost *nil.* Occasionally, slight inflammation occurs, the membrane swells, and slight shooting pains are felt along the distribution of the fifth pair, especially the superior maxillary branches. After a few hours, however, these symptoms disappear and the membrane returns to its former state. Some cases have been reported in which violent inflammation occurred after galvano-caustic applications. I have never met with such a misfortune, the only untoward effect noticed being a momentary polypoid swelling of the membrane of the middle turbinated bone, occurring, strange to say, in the same locality in three patients. The slight inflammation induced by galvano-caustic or acid applications, may cause, as already stated, adhesion of the cauterized area to the membrane of the septum, and thus obstruct the cavity. This should be guarded against by seeing the patient every other day while the inflammatory process is progressing, pledgets of cotton being interposed between

the surfaces to prevent their agglutination, if necessary. If a second application should be deemed advisable, a week, at least, should elapse before making it, in order to allow the local inflammation to subside.

When the hypertrophies are very large, the contraction resulting from simple applications is not sufficiently effective. A portion

Fig 5.



Jarvis' transfixing needles.

of the membrane must be removed. For this purpose, Dr. Jarvis' transfixing needles are very useful. One of these being passed through the growth as shown in Fig. 6, the cautery loop is passed into the nasal cavity over the handle of the needle, and over its point as it protrudes from the surface. The wire being

then tightened around the growth, by depressing the finger-lever of such an instrument as that shown in Fig. 11 (page 69), the circuit is closed, and a few turns of the milled nut at the end of the handle will cause separation of

Fig. 6.



The needle and loop in position.

the transfixed portion of the hypertrophied membrane from its base. The pain experienced is usually very slight, and the wound heals without trouble.

This operation may also be performed in the manner suggested by Dr. Harrison Allen, which consists in applying the heated loop against the side of the growth, and allowing it to burn its way into it, until a portion of the mass can be grasped, when the loop may be narrowed and the portion removed. Dr. Allen employs for this and his other galvano-

Fig. 7.



Allen's galvano-cautery snare.

caustic snaring operations, the ingenious instrument shown in Fig. 7.

The body of the instrument consists of a slotted aluminum barrel containing a screw of equal length. The latter is connected with a vulcanite "carriage" which moves freely over the barrel, and serves for the attachment of the wires and battery cords. A milled nut at

the end of the screw, working on the same principle as that shown in Fig. 8, causes the latter to descend when turned, and the loop is thus drawn home. A novel feature introduced by this instrument, is that the platinum wire is covered with a uniform coat of copper, excepting alone the portion forming the loop, which is bare. The current can in this manner be transmitted along the wires by means of the copper layer.

When the surgeon is not possessed of galvano-cautery instruments, the same operation can be performed with the cold-wire snare shown in Fig. 8, a modification of an instrument invented by Dr. Jarvis. To arm it for use, a small piece of wire two or three inches in length, according to the size of the tumor, is doubled into a loop, and the ends are passed through

Fig. 8.



Author's modification of Jarvis' snare.

the eye of the rod until they protrude a quarter of an inch. Traction being then caused by turning the milled nut, the end of the rod, which otherwise projects beyond the end of the tube a short distance, disappears in the latter, doubling the wire ends on the loop. The loop is then firmly held and ready for use. Being passed over needle transfixing the membrane, the nut is turned until the tumor is firmly held in the grasp of the wire. Care must now be taken not to cause it to cut through too hastily, lest severe hemorrhage occur. Twenty to thirty minutes, at least, should be employed to gradually penetrate the growth, turning the nut once in a while. If performed in this way the operation is hardly painful; but little blood is lost, and the wound heals readily.

The diagnosis of posterior hypertrophies is not difficult when a good view of the posterior nares can be obtained with the rhinoscope. The peculiar ashy color of the white growth, its rugous surface and its situation are so

characteristic, that a mistake can hardly be made. Polypi, however, often resemble them, but their smooth surface and the history of the case are generally sufficient to indicate their nature. The red growths are by no means as common as the white. Their violet hue is also characteristic, while their soft consistence and their tendency to bleed when touched, serve to differentiate them from fibrous polypi or osteomata, with which they might be confounded. When examination of the parts cannot be conducted satisfactorily with the mirror, much information can be obtained by introducing the index finger behind the soft palate, and gently advancing it until its palmar surface comes in contact with the posterior border of the septum. The posterior nares can then be easily made out, and the conformation and density of the parts ascertained.

Repeated observation has demonstrated, conclusively in my opinion, that local medicinal treatment does not influence posterior hypertrophies, and that in all cases, some active

measure must be resorted to which will affect the growth mechanically. The means at our disposal are the same as for anterior hypertrophies:—acids, galvano-cautery, and the galvano-caustic, or cold-wire snare.

Before selecting any of these, however, it is of great importance to determine whether the growth is principally apparent through extensive distention of the venous sinuses—*soft hypertrophies*—as is the case in the majority of the white and in all the red hypertrophies, or whether the fibrous tissue, which predominates in posterior growths, forms the greater portion of its bulk—*hard hypertrophies*—the venous sinuses, in that case, being much smaller and fewer in number. A four per cent. solution of hydrochlorate of cocaine can be used for the purpose, as for anterior hypertrophies. When distended sinuses are the principal cause of the turgescence, immediate contraction will follow and the tumor will almost disappear, whereas if true hypertrophy of all the layers be present, the influence of the drug will hardly be notice-

able. In the first condition, acids or galvano-cautery are indicated, because the snare, by cutting through the enlarged and engorged sinuses, would expose the patient to serious hemorrhage, while in the second, the snare can alone be effective, the acids and galvano-cautery being comparatively powerless to remove the mass of exuberant tissue, which, when cut, bleeds but slightly, if at all.

The position of the growth rendering a view through the anterior nares impossible, the direction and proper location of the acid, cautery knife, or wire loop employed, necessitates the use of the rhinoscope. But as the hand which should hold the tongue-depressor is needed for the operating instrument, the

Fig. 9.



Jarvis' combined rhinoscope and tongue-depressor.

former must either be held by the patient, or an instrument such as that shown in Fig. 9, a combined tongue-depressor and rhinoscope invented by Dr. Jarvis, has to be employed.

For the application of acids, the little instrument represented in Fig. 10, will be found very convenient. It consists of a plated tube

Fig. 10.



Author's acid applicator.

mounted on an ebony handle, and containing a thin rod, which is flattened near the end and curved, the bent portion being hardened so as to possess enough spring to reassume its shape after being straightened out. A slot about one inch in length, cut through the upper surface of the tube, at its point of attachment to the handle, exposes the near end of the rod, which is here furnished with a

knob. This knob is perforated horizontally and perpendicularly, the holes thus formed accommodating a pin which is attached to a flattened spring, which, in turn, is bent in the shape of an arc, and is screwed to the handle. The pin fitting loosely in either of the holes, the spring and rod can be easily disconnected, and the latter's curved tip can thus be pointed in any direction, after which the pin can be inserted in the hole nearest its point. When pressed upon, the spring drives the rod before it, causing its end to protrude beyond that of the instrument, and draws it in again when the pressure is released.

Of the three acids mentioned, chromic acid is by far the most satisfactory for posterior applications. Nitric acid is not sufficiently safe, while glacial acetic acid requires too many applications.

When an application is to be made, the instrument is adjusted so that the curved tip will take the proper direction on emerging, and the end of the rod is protruded. The tip

is heated slightly to the fire of a match, and dipped among the crystals of the acid, then allowed to re-enter the tube. Enough of chromic acid will have adhered to the rod for the application. The tube being passed through the nasal cavity as far as the hypertrophy, the rhinoscope, held with the left hand, is placed in position, and the parts are illuminated. The location of the tube being ascertained, its point is placed against the side of the growth, and the spring is pressed upon. This forces the acid-covered tip to emerge, the bend causing it to apply itself against the growth. By now drawing the instrument out a short distance, the application can be made more effective, the point thus parting with all its acid on the hypertrophied membrane as it rubs against it. The pressure on the spring being then released, the tip disappears in the tube, and the instrument can be withdrawn. A solution of bicarbonate of soda, used posteriorly with the atomizer, is always indicated after this operation, to neutralize any excess

of the acid that might have remained on the membrane, and to limit absorption. Four or five applications of this kind generally cause marked shrinkage of a moderate-sized growth.

Galvano-cautery can also be used in the same manner by introducing the cautery knife instead of the acid applicator. Its use, however, should be limited to septal growths, the close proximity of the turbinate hypertrophies to the mouth of the Eustachian tubes rendering inflammation of the latter liable to occur from the effects of radiation.

When the hypertrophy is of the hard variety, and the use of the snare becomes necessary, preference should be given to the galvanic snare, if that can be obtained. The operation can be performed much more rapidly, and the danger of secondary hemorrhage is avoided. The rhinoscope must of course be employed as for the application of acids, the snare being held and guided with the right hand. In some cases it is necessary to retract the soft palate, in order to avoid its tendency

to adapt itself against the pharynx and interfere with the view during the application of the loop. An easy manner of accomplishing this, is to tie a piece of white tape, a foot long, to the broad end of a small-sized urethral rubber bougie, and to pass the latter through the nasal cavity until its end is seen protruding below the soft palate. Being seized with a pair of forceps, it is drawn out through the mouth, until the tape, which has, of course, followed the catheter, protrudes about as much out of the mouth as its other end protrudes through the nose. The two ends are tied sufficiently tight to leave a satisfactory space at the isthmus, and the catheter is detached and withdrawn. It should, if possible, be applied on the same side as the tumor, but when this cannot be done, and the other nasal cavity is alone permeable, the tape can be passed across the posterior surface of the uvula and caused to emerge through the arch on the side of the hypertrophy when drawn out.

An estimate of the size of the growth hav-

ing been formed, the wire loop should be made sufficiently large to slip over it with

Fig. 11.



1. Author's galvano-cautery snare in position.* 2. Rhinoscopic view.

ease. In the majority of cases, the growth

* This instrument is a modification of Shurly's handle.

protrudes sufficiently beyond the outline of the turbinated body to be easily caught in the loop, but at times it does not, and the wire slips over its surface without engaging it. When such is the case, the loop should be bent on the tube at an angle of about fifty degrees, before introducing it. When traction is produced, the loop will first straighten itself, then lean over to the opposite side, and, if properly adjusted, encircle the tumor. If the galvano-cautery snare is employed, pressure is exerted on the finger-lever as shown in Fig. 10, without, however, closing the circuit. This will cause the wire to tighten itself around the growth until a pedicle is formed. Leaving it in this position for a few moments, the rhinoscope is withdrawn, and the left hand is used to turn the milled nut at the end of the instrument. The circuit being now closed, a quarter revolution of the nut will cause the glowing wire to bury itself in the tissues, coagulating the blood in the severed vessels and preventing what hemorrhage might occur.

As soon as the nut stops turning, the circuit is broken, and after waiting a couple of minutes the same process is repeated, to be again arrested and renewed until complete separation of the growth occurs. With the cold snare, the procedure is the same, only that much more time should be employed, to accomplish the operation safely. Although the chances of hemorrhage are very small in hard hypertrophies, one moderately large sinus would be sufficient to cause copious bleeding, this usually occurring some time after the operation, when the physician is not on hand to arrest it.

The wire generally employed for these operations is what is known as the No. 5 piano wire, which possesses more elasticity and tensile strength than ordinary annealed wire. When the loop has engaged the mass firmly, which can be ascertained by withdrawing the instrument until its progress becomes arrested by the tumor, a few turns of the milled nut will secure it. The exact

position of the wire should now be determined with the rhinoscope, and if satisfactory, the nut is turned slowly until firm resistance is felt. After a few minutes another turn is given, repeating the periods of rest and traction, until the growth has been completely severed. The mass usually comes out with the snare, but when it does not the latter should be used as a probe to push it into the posterior nasal cavity, and cause it to drop through the isthmus into the mouth; or, the patient can be directed to inhale violently through the cavity operated in, the nostril of the other side being closed with the finger. An insufflation of pure tannin will greatly lessen the chances of secondary hemorrhage, and the patient should be ordered a small quantity to use as snuff, should bleeding occur.

Having described the treatment of the abnormal conditions of the nasal cavities which are most frequently found in connection with the hay fever dyscrasia, we must refer the

reader to general works on nasal diseases for information as to the curative measures to be employed when other affections are encountered, such as polypi, deviations of the septum, etc., and proceed to the description of the method employed to annul the hyperæsthesia in the other portions of the nasal cavities.

Organic alteration of the surface of the membrane can be induced by the application of galvano-cautery, or of caustic acids. Each sensitive spot must be ascertained and treated with the agent used until the exaggerated sensitiveness is replaced by the normal sensation of contact. When the galvano-cautery is to be used, it is very essential to have a battery powerful enough to cause the platinum loop to suddenly attain white heat, so as to avoid the pain caused by the gradual increase of temperature, and prevent prolonged radiation. This condition being fulfilled, we require a loop which, upon being entered into the nasal cavity, will be sufficiently blunt at the point and edges, not to scratch or cut the mucous

membrane, when gently passed over it. I have

Fig. 12.



The cautery knife applied to the anterior area. *c*, middle area; *a*, posterior area; *d* and *e*, sensitive surface of middle turbinated body.

found the tip shown in Fig. 12, which resembles an ordinary cautery knife, but is more

rounded at the point and somewhat broader, most satisfactory. It can be easily introduced in all the sinuosities of the fossæ.

The nasal cavity being properly dilated and illuminated, the cautery knife is introduced gently and applied flatwise to the anterior area as indicated in the cut. If the part is not sensitive, the patient will not wince, the sensation being hardly more than a slight itching. If it is hyperæsthetic, a feeling of intense itching or burning will be complained of, followed, in some cases, by profuse lachrymation. As soon as the evidences of abnormal sensitiveness appear, care should be taken not to move the platinum tip, and the circuit being closed, the metal singes the spot, destroying the superficial nervous filaments. If the platinum becomes white hot immediately, comparatively little if any pain will be experienced, but the contrary will certainly be the case, if a weak current, or a knife so thin that the nasal mucus will prevent it from becoming heated rapidly, is used.

One spot being cauterized, another sensitive spot is searched for by gently passing the loop over the surface until the patient complains of the sensations experienced before, when the current is again applied. In this manner the entire respiratory area should be gone over, until the instrument can be applied to any part of the membrane without exciting reflex symptoms or causing the violent itching or burning, which the patient soon learns to recognize.

The pain accompanying these applications varies according to the degree of heat employed. White heat, which cauterizes in an instant, destroys the nerve filaments before they have time to convey the sensation of pain to the nerve centres. Cherry heat causes some pain, while black heat is exceedingly painful. White heat, therefore, should always be employed for superficial applications.

The cauterizations should always be begun in the anterior portions of the nasal cavity, (except when reflex asthma is present, as a com-

plication of the affection, for reasons which will be explained later on), so that the anterior hyperæsthesia will not be present when the posterior parts are examined, and thus conceal the sensitiveness, or convey a wrong idea as to its location. The septum should be as carefully examined as the turbinated bones, and any spot of even doubtful hyperæsthesia cauterized.

Three or four spots can be cauterized at one sitting, and it is best to locate them some distance apart. A sensitive spot being found in the upper part of the anterior area, for instance, and cauterized, the next spot should be looked for in the lower part of the septum, etc. In short, the object should be to avoid large superficial abrasions, numerous small ones healing much faster and producing no disagreeable after-effects. In the great majority of cases, a few minutes after the applications are made, all annoying sensations are passed, and the patient can return to his business without fear of being in the least troubled. In some few, however, the membrane swells

for awhile, and the patient may experience difficulty in breathing through the nose. When such is the case, one nostril should be treated at each visit, so as to preserve for the patient the patency of the other, and thus insure him comparatively free respiration.

In two cases, so far, the applications were followed by an attack of coryza, accompanied by reflex symptoms. In one case it lasted ten hours, in the other it continued about twenty-four.

The membrane covering the middle turbinated bone does not seem to enter the process of resolution after galvano-cautery applications, as readily as the other portions of the respiraratory region. In three cases in my practice, œdematous inflammation took place, which caused me to mistake the overhanging, grape-like protuberance for a polypus. In one case I snared it off, causing immediate recovery; the two others were left to themselves, and disappeared after a few weeks. Fortunately, the limited innervation of the surface of the

middle turbinated membrane, renders but few applications necessary, and they should be made sufficiently far apart to insure complete resolution after each sitting.

Important in this connection is the proper topographical recognition of the olfactory membrane, which includes the upper third of the middle turbinated body. Care should of course be taken not to cauterize it, and to limit the applications over the turbinated bone to its lower half. With this precaution, no danger to the sense of smell need be apprehended.

The number of applications required to render immunity positive, depends of course, upon the number of sensitive spots. With some, five sittings are sufficient, while in the majority of patients from fifteen to twenty are required, each from three days to one week apart, the length of the interval depending upon the rapidity with which resolution of each cauterized spot takes place.

When the physician is not possessed of

galvano-cautery instruments, acids may be used instead. Chromic acid would be the best of any, were it not for the danger of general toxæmia following its application over comparatively large surfaces. Glacial acetic acid, with which I treated my first cases in the spring of 1881, is the most satisfactory in every way except one—the pain its application gives rise to, on account of the quantity which has to be used. This fact, however, can in a great measure be corrected by dissolving in it hydrochlorate of cocaine to saturation. Another feature characterizing its use, is the turgescence which takes place after each application, as stated when speaking of the treatment of anterior hypertrophies. The hydrochlorate of cocaine seems also to influence this result, by limiting the inflammation markedly and advancing resolution. Dr. Beverly Robinson, of New York,* has reported good results with applications of pure carbolic acid. Unlike when it is applied

* Archives of Am. Laryngol. Association for 1884, p. 114.

to other parts I found that this acid caused much pain, besides imparting its well-known odor, and I therefore discontinued its use. Nitric acid should never be used, except for the reduction of hypertrophies as described.

Fig. 13.



Author's glacial acetic acid applicator.

For the application of glacial acetic acid, the instrument shown in Fig. 13 will be found very satisfactory. It consists of two probes, shaped like Bosworth's (Fig. 3), in close apposition, their surfaces being so flattened as to render their contact perfect. One of the

probes is fastened to the handle and is furnished with a number of shallow holes, a distance of one-half inch along the inner surface of its extremity, so that a drop of acid will be retained when the other probe is placed over it. The latter having free longitudinal motion, can be moved freely along the other by means of a finger lever, thus uncovering at will the acid-covered surface.* The two probes are so arranged that they can be rotated together on their axis, so that the acid-covered surface can be made to face any direction. Their broad ends being of silver, the acid does not affect them.

The manipulation of this instrument is precisely the same as that of the galvano-caustic knife. Being introduced into the cavity, a sensitive spot is searched for with both probes in apposition, and as soon as it is found, the finger lever is depressed and

*The priority of the uncovering mechanism belongs to Dr. Alex. McCoy, of this city, who first applied it to a laryngeal applicator of his invention, to be soon published.

the acid probe being uncovered, the spot is cauterized. The finger lever is then allowed to raise, and the instrument can be withdrawn without cauterizing any other surface. Care should be taken to cleanse the instrument carefully before entering it into the nose, lest some acid remain over its surface.

As to the effectiveness of this procedure, I will cite the case of —

Miss M., who was treated in 1881, and whose accesses had appeared regularly for several years. The application of glacial acetic acid not only prevented the symptoms that year and ever since, but made her mucous membrane absolutely invulnerable to the effects of pollen. As a test, she exposed herself as much as possible to the emanations of the plants which she knew to be the most liable to occasion a manifestation of the disease, and went even so far as to place bouquets in her bed-room and to approach a field of clover, her most dangerous enemy.

As to the period when the applications should be made, I am of the opinion that the treatment should be begun at least two

months before the expected attack. There is sufficient time left then, to annul all the hyperæsthetic spots (in the great majority of cases) without having to crowd the applications together, an unsatisfactory procedure, since the inflammation is likely to impair the abnormal hyperæsthesia and prevent proper recognition of the sensitive spots.

In three cases so far, however, I have been able to arrest the paroxysm from one to three weeks after it had begun, and when it was at its height.

Mr. S., of this city, was suffering intensely, and notwithstanding the irritable condition of his nose, allowed me to make four applications in each nostril. A few days later he returned, feeling considerably relieved, and the operation was repeated with the same number of applications. A week later, I received a postal card from him, stating that he had had no hay fever since the last application. These were all made in the anterior portion of the cavities. This gentleman being a member of a cricket club, was enabled at once to resume his position in the

field without suffering the least inconvenience. He continued with the treatment, coming regularly until all the hyperæsthetic spots had been cauterized. The following season Mr. S. returned, stating that his hay fever had appeared on the usual day. Examining the nasal cavities very carefully, I found no hyperæsthesia except at the anterior area, on both sides, limited to a spot about as large as a small pea. One cauterization on each side arrested the paroxysm, and no recurrence took place.

Mr. B., of Chicago, Ill., placed himself under treatment five days after the onset of the paroxysm. Having come to Philadelphia expecting that the treatment would only require one week, and being obliged to return home at the end of that time, the applications were made every day to each nostril. The attack ceased after the third application, and did not return, notwithstanding the railroad travelling, which, before, caused great suffering.

This result, however, cannot be expected in every case, but the applications are beneficial in all, and reduce in a marked manner the intensity of the paroxysm and its duration. Of seven cases treated last season in

the midst of the hay fever, three were entirely relieved, three were very much benefited, and the seventh was enabled to return to his business, from an imprisonment in a dark room. Although his sufferings were much abated, they continued until the end of his usual six weeks.

When the treatment is begun at the proper time, *i.e.*, several weeks before the paroxysm, its success depends entirely upon the thoroughness with which both nasal cavities have been relieved of their sensitive spots. An insufficient number of applications, or a timid patient, are as likely to prevent a radical cure, as a thorough treatment in a plucky patient is certain to be rewarded with permanent immunity.

Mr. M., of this city, had been subject to hay fever forty-two years. The intensity of the attacks was so great, that unless he absented himself from the city to spend a season in a region where he enjoyed immunity, he was obliged to remain in a dark room the greater part of the period of suffering. The appli-

cations, begun three weeks before the expected attack, were continued twice a week until the 15th of August, the usual date of the onset. No symptoms of hay fever appeared. The patient being desirous of having all the sensitive areas cauterized, this was accomplished in ten more sittings, in the midst of the hay fever period, without the least manifestation of the disease. Mr. M. at that time finding it necessary to make a trip to the Western States, feared greatly the necessary railroad travelling, which had always, during the pollen season, caused intense suffering. He, nevertheless, bravely undertook the journey, and notwithstanding the presence of much dust, returned, after having ridden over two thousand miles without having experienced the least manifestation of the disease. *The treatment had been limited to superficial cauterizations*, no abnormal condition of the membrane existing other than the hyperæsthesia.

Master L., aged eight, had suffered severely for several years, his paroxysms being accompanied with violent asthma. The treatment was begun five weeks before the date of the onset, the applications being made twice a week. A few days after the usual time for the attack of hay fever to begin, slight palpebral pruritus and lachrymation occurred, but stopped

after a couple of days. The treatment was continued for some time during the hay fever season, notwithstanding which, complete freedom from all symptoms of the affection (including asthma) was enjoyed. In this case the hyperæsthesia was greatest over the posterior and anterior areas, *superficial cauterizations being alone used* during the entire treatment.

As an evidence of the influence of imperfect cauterization on the results of the treatment, I will cite the case of—

Mr. T., in whom great hyperæsthesia of the entire mucous tract rendered the least contact with any object painful. He suffered greatly every year, and his attacks were complicated with asthma and general systemic disturbance. Owing to the great sensitiveness of the membrane, which caused the patient to spring back as soon as the cautery had penetrated the nasal cavity, the applications could only be made at random, and were all limited to the anterior and middle areas, cauterization of the posterior area being impossible. The nasal symptoms were almost entirely prevented, but the asthma occurred with unusual intensity.

In another case of this kind, however, the result was entirely different:—

Miss S., of Bridgeport, had had hay fever since her childhood, marked asthma accompanying each attack. The timidity of the patient rendering limitation of the cauterizations to the sensitive spots impossible, I concluded to singe the entire respiratory region on each side, by drawing the glowing loop along the surface of the membrane from front to back, involving the three sensitive areas. No symptom of hay fever (including the asthma) appeared.

An important point in connection with the results of imperfect cauterization is that however limited the number of applications may be, the benefit produced, as far as the nasal symptoms are concerned, is proportionate with that number, and with the thoroughness with which they are performed. When but a limited number of applications are made before the period of attack, the onset of the paroxysm is retarded, which naturally curtails the duration of the disease, while its intensity is reduced.

Mr. C. applied for treatment two months before the expected attack. Two applications were made at ten days' interval, but, the patient being obliged to absent himself on business, the treatment could not be continued. Some months later a letter from him announced that the attack had been delayed several weeks, and that it had been milder, continuing, as usual, throughout the greater part of October.

Mrs. B., who had been a sufferer eleven years, applied for treatment three days before the usual date of her attack. An application was made at once, and the cauterizations were continued at four days' interval until two weeks after the time her paroxysm was to begin, but which had not appeared. Mrs. B., desiring to attend a wedding in Connecticut, stood the six hours' railway trip without inconvenience, but three days after her arrival there, the hay fever appeared, and, although in milder form, continued unabated until the time at which it usually ceased.

Again, when reflex asthma is a complication of the affection, and an insufficient number of applications have been made, this symptom is likely to appear as the sole expression of the paroxysm, the head symptoms being ab-

sent, or if present, exceedingly mild. This is doubtless due to the fact that the first applications being made anteriorly, the sensitive spots in the anterior and middle areas are more or less deprived of their hyperæsthesia (the presence and intensity of the head symptoms depending upon the thoroughness with which this is done), and the posterior area being only cauterized towards the end of the treatment, the symptoms which are secondary to its irritation present themselves. This is well exemplified in the following case:

Mrs. P., who had been afflicted since her childhood, and in whom asthma was a prominent symptom, placed herself under treatment four weeks before the expected attack. The applications were made twice a week. The first two weeks of the annual access seemed rather discouraging, as the asthma appeared as usual, although the head symptoms were very slight. The treatment was continued, however, until all the hyperæsthetic spots, including the posterior, had been cauterized. The symptoms of the affection subsided, although in the midst of the annual period

of suffering Mrs. P., wishing to call on some relatives some distance from Philadelphia, undertook the trip, notwithstanding the amount of suffering which railroad travelling usually occasioned.

Some time later, I received a letter from the lady's husband, a professional colleague, who wrote as follows:

"Mrs. P. and myself came directly here, a distance of about two hundred miles from Philadelphia. Beyond a little fatigue incident to the journey in the hottest of hot weather, Mrs. P. experienced no discomfort whatever. Since she came here, her health has been excellent, and whatever symptoms she had of the presence of the 'tormentor' rapidly subsided. In fact, I may say that the month of September, thus far, has found her completely free from the trouble, and that too in a locality where in other years she has spent the larger part of the month in bed. Her health has been as good as at any other time of the year, notwithstanding the intense heat of the earlier days of the present month. * * *."

A conclusion which I have come to lately, and which is borne out in the above cases and

by close observation in all the others, is that when reflex asthma exists as a complication of the head symptoms, a greater number of applications are required than when it does not, and that immunity from all the symptoms can only be obtained when all three of the sensitive areas have been thoroughly treated, the treatment of the posterior area being such as to limit the inordinate power of turgescence, which is always present when true hypertrophy does not exist. In accordance with this view, I now direct my attention first to the posterior area, *when reflex asthma exists*, employing chromic acid, galvano-cautery, or the snare écraseur as needs be. This is greatly facilitated by annulling the hyperæsthesia of the anterior and middle areas with a four per cent. solution of cocaine.

In the cases in which asthma is the only symptom, this procedure, when thoroughly conducted, will often suffice to cure the affection, even, sometimes, when mild head symptoms are present (these being due to implication of

what terminal filaments of the nasal nerve may extend in the sensitive region), but, as these cases are rare, applications to the anterior and middle areas are nearly always necessary.

Again, a mild case of hay fever, complicated with reflex asthma, may be due solely to hyperæsthesia of the middle area, and be cured by a treatment limited to it. Here, the asthma is due to the turgescence of the posterior area occurring as a result of the inflammatory process, while the head symptoms are induced, as just stated, through implication of the nasal nerve in the hyperæsthetic region. I am of the opinion, however, that it is always best to include the posterior ends of the turbinated bodies in the treatment.

As stated under the heading of *Pathology*, catarrhal asthma, which occurs late in the history of the affection, is much more frequently met with than the reflex variety, which comes on as soon as the Schneiderian membrane has become sufficiently turgid, through the local inflammation, to induce

pressure against that of the septum. Being due to extension of the inflammation by continuity of tissue, it can only present itself, provided the nasal symptoms take place, and prevention of the latter will obviously deprive the asthma of its primary cause and prevent it. When the membrane is free from hypertrophies, etc., cauterization of the sensitive spots, whether these be situated in the anterior, middle or posterior areas, will therefore be sufficient to prevent both head symptoms and asthma, a fact so far demonstrated in six cases.

When the head symptoms solely characterize the accesses, the greatest hyperæsthesia will be found in the anterior area, which will of course require the brunt of the treatment. Any other sensitive spot, however, should also be effectively cauterized.

The internal administration of nerve-tonics such as strychnia, nux vomica, etc., and chalybeates where anæmia exists, is a valuable adjuvant to the local treatment. Quinia seems to exert a beneficial influence in preventing

what premonitory symptoms the patient may be liable to, two grains being administered three times daily. When the patient applies for treatment during a paroxysm or just before it, a four per cent. solution of hydrochlorate of cocaine applied with a cotton pledget every two hours, will doubtless furnish much relief, judging from its effects in acute coryza. It should not be used, however, at least three hours before the cauterizations, so as to avoid the interference with the discernment of sensitive spots, which its anæsthetic property might occasion.

After-effects of the local treatment.—Although the number of cases treated so far has been rather large, I have not had to regret any ill-effect occurring as a result of the treatment. The sense of smell instead of being obtunded, is frequently improved, especially when anterior hypertrophies are reduced in the course of the treatment. This is easily explained by the fact that the olfactory membrane is not involved in the treatment, and that by facili-

tating the passage of air by the reduction of the tumefactions, the odoriferous particles can reach the olfactory area in greater number and with more freedom.

The permanent nasal hyperæsthesia which exists in the majority of hay fever cases, through which irritating substances cause much annoyance, itching, sneezing, etc., is naturally obviated in every instance. The following abstract, which alludes to a patient already mentioned, will illustrate the truth of this assertion:

"We came directly to W. to find the city suffering from a drought which was protracted to the end of the month. The dust and heat were intolerable. We had some of the very hottest weather in October. Mrs. P. did not experience the least annoyance, notwithstanding these unfavorable conditions. Besides, she returned to W. earlier by five weeks than she had ever dared to for years. Indeed, her return some years had been protracted as late as now (Dec. 17th), depending, of course, upon the early or late fall. She could not have selected a more unhappy period, had

she been still a sufferer from hay fever, than the time mentioned; and it continued, with here and there a cool day, all through October and part of November. The dust was dreadful. She did not experience the slightest discomfort from any of these untoward conditions. As she told you, heretofore, in winter even, the least amount of dust, from cloth, for instance, would irritate her very much. This susceptibility is entirely removed, etc."

As to the permanency of the immunity, it depends, of course, upon the thoroughness with which the treatment is conducted. A spot as large as a small pea, left in its hyperæsthetic state may not be active during the period of the first paroxysm, owing to the proximity of the curative treatment and the temporary local inflammation set up by it, while the following year, having reassumed its hyperæsthesia, it may occasion unmistakable, although slight symptoms of the disease. This was illustrated in the case of Mr. S., page 84, in whom one application in each anterior area, however, sufficed to arrest all manifestations. In all

cases in which a satisfactory treatment could be carried out, the patient possessing enough self-control to allow me to make the applications in a thorough manner, the symptoms did not recur; and as two cases treated in 1881 are included in the number, the radical character of the cure becomes evident. This is further corroborated by the cases reported by Daly,* Roe,† and Shurly.‡

The conclusions to be drawn can be summarized as follows:

1. That, as a result of heredity or of diseases implicating markedly the nervous system, the nerve centres become abnormally sensitive, and are, therefore, inordinately influenced by the external elements to which they are naturally susceptible.

2. That, as a result of local disease, the portions of the nasal mucous membrane over which the branches of the spheno-palatine

* *Op. cit.* † *Op. cit.* ‡ Archives Am. Laryng. Assoc. for 1884.

ganglion and those of the nasal branches of the ophthalmic nerves are distributed become hyperæsthetic, and capable of acting as media for the transmission of impressions made upon their surface to the nerve centres.

3. That when these two conditions co-exist and when the external elements to which the nerve centres are inordinately sensitive are present in the atmosphere, a paroxysm termed "hay fever" is excited.

4. That the paroxysm cannot take place unless the inordinate susceptibility of the nerve centres, the intra-nasal hyperæsthesia and the external irritating cause are present simultaneously.

5. That since one of the necessary elements, the external irritating cause, is only present at a certain time each year, the paroxysm can only occur at that certain time.

6. That as a consequence of the above, elimination one of the three elements necessary to the production of a paroxysm will prevent its occurrence.

7. That by cauterizing by means of galvano-cautery or acids the hyperæsthetic portions of the membrane, their hyperæsthesia can be permanently annulled.

8. That the medium between the external irritating cause and the systemic dyscrasia being thus obliterated, the periodical paroxysms termed "hay fever" become impossible.

9. That there are in the nose three hyperæsthetic areas, for which the terms posterior, middle and anterior areas are proposed, and which are individually or conjointly the principal seats of the hyperæsthesia in hay fever subjects.

10. That the posterior area is principally implicated when reflex asthma is the most prominent symptom of the affection.

11. That the anterior area is principally implicated when head symptoms are alone present.

12. That when head symptoms and reflex asthma are present both anterior and posterior areas are implicated.

13. That the middle area may alone be the starting point of all the symptoms combined.

14. That catarrhal asthma has no relation with the nasal hyperæsthesia, being merely a result of the local inflammation occurring during a paroxysm.

As bearing directly upon the treatment, I would suggest the following:—

1. That all abnormal conditions of the nasal cavities, such as marked hypertrophies, polypi, exostoses, etc., must be eradicated before instituting the superficial cauterizations.

2. That the latter are productive of best results when begun six weeks at least before the onset of the paroxysm.

3. That the treatment can be conducted *during* a paroxysm, the latter being arrested in some and beneficially modified in others.

4. That the immunity against hay fever depends upon the thoroughness with which the treatment is conducted.

In a paper read before the American Laryngological Association, on the 12th of May, 1884, I inadvertently overlooked the fact that Dr. W. H. Daly, of Pittsburgh, Pa., had been the first to demonstrate to the profession the relation of hay fever and disease of the nasal cavities, and accorded the credit to Dr. J. O. Roe, of Rochester, N. Y., who subsequently developed the same view in the admirable paper cited. I, therefore, take advantage of this opportunity to rectify my error. In justice to myself, however, I must also state that my paper, entitled "Notes on Hay Fever," published December 22, 1883, was the first to demonstrate the practical value of superficial organic alteration of the nasal mucous membrane as a radical remedy for the disease, and that I am, therefore, entitled to the priority of this method of treatment.

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LECTURES

ON

DISEASES

OF THE

NOSE AND THROAT.

BY

CHARLES E. SAJOUS, M.D.,

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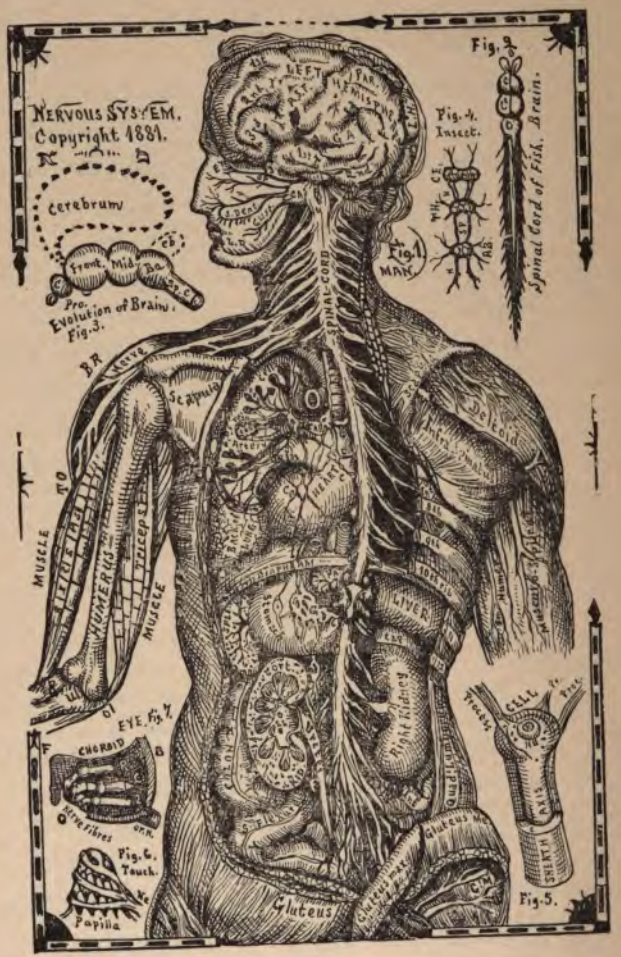
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Physician to the Belfast Royal Hospital, Consulting Physician to the Ulster Hospital for Women and Children, Vice-President of the Ulster Medical Society, Author of "Manual of Pharmacy, Materia Medica and Therapeutics." 3d Edition.


NERVOUS SYSTEM.
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Cerebrum
Front. Mid. Pa.
Pro.
Evolution of Brain.
Fig.3.
Fig.4.
Insect.
Fig.1
MAN
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Fig.5.

PHYSIOLOGICAL CHARTS OF LIFE.

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